

# Agricultural (Nonbiomedical) Animal Research Outside the Laboratory: A Review of Guidelines for Institutional Animal Care and Use Committees

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## Abstract

Challenges and published guidelines associated with appropriate care and use of farm animals in agricultural research conducted outside the laboratory are briefly reviewed. The Animal Welfare Act (Title 9 of the 2000 Code of Federal Regulations), which regulates the care and use of agricultural animals in biomedical research, does not include livestock and poultry used in agricultural research. Farm animal research funded (and thereby regulated) by the US Public Health Service is further discussed in the National Research Council's 1996 *Guide for the Care and Use of Laboratory Animals*. However, neither of these guidelines adequately addresses the unique attributes of research and teaching designed to improve production agriculture. That information is contained in the *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching* (the *Ag Guide*), published by the Federation of Animal Science Societies in 1999. The *Ag Guide* provides excellent general recommendations for agricultural animal research. It serves as an invaluable resource for institutional animal care and use committees, which attempt to balance the welfare of farm animals and the needs of those working to improve animal agriculture.

**Key Words:** agricultural animals; animal welfare; IACUC; livestock; research

## Introduction

The ever-increasing productivity and efficiency of animal agriculture are the result of ongoing research. New knowledge is needed continually to address the diverse needs and concerns of a growing world population. The pressing need for new information is evidenced by the large investment in research on various environmental and social concerns associated with production animal agriculture. Farm animals are essential to the research effort to find science-based solutions to meet these challenges. However, the care and use of farm animals used specifically in agri-

cultural research are not included in the Animal Welfare Act (AWA<sup>1</sup>) (CFR 2000). The Act defines agricultural animal research as those studies conducted with livestock or poultry that are designed to improve animal nutrition, breeding management, or production efficiency, or the quality of food or fiber. Efforts to understand and develop effective methods to manage the environmental aspects of production animal agriculture are also included in this definition. Yet neither the AWA nor the *Guide for the Care and Use of Laboratory Animals* (NRC 1996) adequately addresses the issues associated with the care and use of agricultural animals in agricultural research.

Farm animal research for the benefit of animal agriculture may be performed in laboratory settings (e.g., various surgical procedures, metabolic chambers, BL-3 studies); however, it is more commonly conducted in facilities that mirror typical agricultural production units, helping to ensure relevance. Although farm animal research conducted outside the laboratory presents a number of unique concerns for members of institutional animal care and use committees (IACUCs<sup>1</sup>), fundamental animal care and use considerations are common to both settings. In both settings, it is imperative to meet basic nutritional, environmental, and behavioral needs.

## Regulatory Guidance

The *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching* (hereafter termed the *Ag Guide*<sup>1</sup>) (FASS 1999) provides excellent general guidance for establishing effective institutional policies, health care standards, and species-specific animal husbandry procedures. In contrast to the AWA and NRC guidelines, the *Ag Guide* lacks regulatory authority. However, it generally is recognized as the benchmark for agricultural animal care and use. The US Department of Agriculture Animal Plant Health Inspection Service (USDA APHIS<sup>1</sup>) recently issued animal care policy 29 (<http://www.aphis.usda.gov/ac/>

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<sup>1</sup>Abbreviations used in this article: *Ag Guide*, *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching*; AWA, Animal Welfare Act; IACUC, institutional animal care and use committee; USDA APHIS, US Department of Agriculture Animal Plant Health Inspection Service.

polmanpdf.html), which adopts the *Ag Guide* for the purpose of providing more specific guidance for the care and use of farm animals in biomedical research (APHIS 2000). This action was taken in recognition of the unique needs of farm animals compared with those more traditionally used in biomedical research.

A more detailed interpretation of the AWA farm animal exemption is provided in USDA APHIS animal care policy 26 (APHIS 1998). The policy provides specific examples of biomedical research activities (i.e., farm animals used to test or manufacture veterinary biologicals for both pets and non-production farm animals), which would be monitored for AWA compliance. The Association for the Accreditation and Assessment of Laboratory Animal Care International also has adopted large portions of the *Ag Guide* as the standard for the assessment and accreditation of agricultural animal care and use at facilities conducting biomedical as well as agricultural research (<http://www.aaalac.org/agriculture.htm>).

## Physical Facilities

Agricultural animals thrive in environments ranging from wide open spaces to strict confinement. The *Ag Guide* provides reasonable engineering standards for the assessment of a variety of agricultural research settings outside the laboratory. However, the diversity of agricultural research frequently creates challenges that are not addressed specifically. Professional judgment is required to develop effective solutions. The most important factor guiding this process should be the well-being of the animals involved. Animal well-being can be divided into physical and psychological components. The *Ag Guide* cites the following basic criteria used by the authors to assess how effectively these needs are addressed: (1) behavior patterns, (2) pathological and immunological traits, (3) physiological and biochemical characteristics, and (4) reproductive and productive performance of the individual.

General concerns presented by agricultural research outside the laboratory include environmental conditions, sanitation, nutritional quality of pastures, and social interactions. Protection from the elements and provision of adequate space, lighting, ventilation, and sanitation in various outdoor and indoor settings must be addressed on a situational basis. Specialized facility designs can be particularly problematic for the IACUC. The management of various species in confined production systems requires close attention to ensure that the criteria for animal well-being receive appropriate consideration.

## Repair and Maintenance

Funding limitations present some of the most difficult management challenges for the IACUC. Inadequate facilities

preclude adequate animal care and use, and they diminish the validity of attendant research. Facility utilization must conform to the constraints imposed by the *Ag Guide*, as well as the institutional repair and maintenance budget. Creative solutions must be found that allow reasonable incorporation while preserving the integrity of the animal care and use program. More efficient experimental design, off-site collaboration, extramural funding, and redirection of existing funds may help alleviate facility demands.

## Semiannual Facility Review

Large programs that cover hundreds or thousands of acres, dozens of buildings, and remote sites present a formidable logistical challenge. Effective planning must balance the requirement for thorough inspection with the need to complete the process in a timely manner. The size and scope of the task, as well as competing interests and responsibilities among various institutional stakeholders, can make the semiannual facility review process contentious. This problem can be avoided, in part, by establishing a reasonable inspection itinerary, maintaining an adequate training program for all parties, and by including decision makers from all stakeholder groups on the inspection team. Representatives from the repair and maintenance community can help IACUC members quickly identify practical solutions to facility problems far beyond their expertise.

Additional assistance is especially important for large animal facilities, which must withstand environmental extremes and the activity of powerful, determined research subjects. Professional committee staff can provide in-depth knowledge and experience that are essential to an effective inspection process. Administrators and facility managers justifiably raise concerns when regulatory guidance appears to be applied inconsistently. Effective training and strong IACUC leadership also help minimize the potential loss of continuity created by the rotation of IACUC volunteers and key personnel changes.

## Disaster Preparedness

A contingency plan must be in place to ensure the well-being of research animals in the event of natural disasters. Excellent guidance on disaster planning for farm animals is available in the Animal Welfare Information Center publication titled *Information Resources for IACUCs* (Casper et al. 1999). Alternate sources of food, water, shelter, and power must be identified.

It is also important to develop a workable evacuation plan. If enclosures are damaged or destroyed, agricultural animals may be dispersed over a wide area after a disaster. Local police and animal control authorities should have contact information to facilitate rapid recovery of livestock.

## Animal Care Personnel

### Staffing

The care and use of large agricultural animals often require caretakers to work in groups to ensure animal well-being and personal safety. Many institutions struggle to attract and retain well-qualified caretakers. Human resource departments often fail to recognize the knowledge and skill required to perform the job effectively. Each species presents distinct challenges. Years of experience may be required to appreciate the application of appropriate husbandry practices fully and to assess the health and well-being of individual animals accurately. Routine production operations may require advanced technical expertise before research inputs are even considered. Modern dairy, poultry, and confinement hog units are excellent examples.

Outside assistance must be sought whenever the IACUC lacks sufficient expertise to evaluate optimal management strategies that also safeguard animal well-being. Various consultants (e.g., veterinary specialists, animal scientists, nutritionists, and agricultural engineers) often provide the most efficient access to current agricultural practices. Personnel from the Office of Laboratory Animal Welfare and USDA APHIS Veterinary Care also provide helpful guidance on specific issues on request.

### Training

An effective training program for all personnel associated with animal care and use, including IACUC members, scientists, technicians, animal caretakers, and administrators, represents the single most effective tool available to ensure the humane treatment of all institutional animals. Well-trained, competent animal caretakers are the first line of defense. They work closely with the animals on a daily basis and are well positioned to provide an invaluable quality assurance service for all animal care and use.

Caretakers must be well informed regarding the research or teaching being conducted and the function of the institutional animal care and use program. They must understand their role in reporting questionable activities and have clear lines of communication with the IACUC. Access to high-quality continuing education opportunities helps to ensure that caretakers keep abreast of current agricultural practices for the species assigned. Many formal programs are available in residence or online through educational institutions and various public and private organizations (e.g., Office of Laboratory Animal Welfare, <http://grants.nih.gov/grants/olaw/olaw.htm>; American Association for Laboratory Animal Science, <http://www.aalas.org>; Laboratory Animal Training Association, <http://www.latanet.com>; accredited programs in Veterinary Technology, <http://www.avma.org/education/edudefault.asp>). The attending veterinarian, credentialed veterinary technician, or resident animal scientists also can provide excellent in-service train-

ing for animal caretakers. Specific needs often are addressed effectively by hosting an outside expert to provide a directed educational program.

Agricultural animals present a number of occupational health hazards. Injuries, allergies, and zoonotic infections represent the greatest risks for animal caretakers. These risks can be managed most effectively by providing appropriate worker training.

## IACUC Considerations and Potential Problem Areas

### Committee Composition

Appropriate evaluation of agricultural animal research and teaching requires greater IACUC diversity than the minimum requirements outlined in the AWA and Public Health Service policy. Scientists, caretakers, and veterinarians familiar with the management of livestock and poultry must be appointed to ensure that the committee is capable of conducting adequate protocol review and program management.

### Production Versus Research

Meaningful research begins at the limit of current knowledge. Therefore, relevant agricultural research is predicated on the availability of contemporary production systems. It is difficult to maintain optimal productivity when top-producing animals are selectively removed from the unit for research projects or experimental interventions are introduced that diminish performance. It is important to include facility managers and caretakers as informed members of the research team. Knowledge of the purpose, progress, and impact of the research helps relieve the tension created by competing demands for optimal production and research results.

### Standard Agricultural Practices

Standard agricultural practices represent sensible solutions used in the field. To study various animal health or production parameters effectively, it is often necessary to emulate these methods in research and teaching. Some examples in various animal species include castration; dehorning; tail-docking; hoof-, teeth-, comb-, or beak-trimming; and induced molting. These procedures are typically performed on young animals, which reduces the amount of tissue removed and thus helps to minimize pain and distress. Operator skill and experience are critical for humane application, which must be assessed thoroughly before IACUC approval. A number of steps, including the use of analgesics and/or alternatives, may be taken at the discretion of the IACUC to reduce pain and distress further.

## Assessment of Animal Well-being

As stated above, caretakers represent the first line of defense for appropriate animal care and use. They must have the training and motivation to assess animal well-being on a continual basis. Animals that exhibit subtle changes in behavior, appearance, or performance must be brought to the attention of supervisors, investigators, and the attending veterinarian. Everyone must understand that reliable results depend on the health and well-being of research subjects.

## Biosecurity

Adequate quarantine procedures and other measures must be followed to prevent the inadvertent spread of infectious disease among barns and pastures. Restricted access may cause public relation problems for institutions located at the urban/rural interface. Visitors permitted in close proximity to animals must be required to follow standard precautions approved by the attending veterinarian and the IACUC. Animal health must always take precedence.

Herd or flock health programs must include adequate isolation periods for new or sick animals, testing protocols, vaccination schedules, and sanitation procedures to minimize pathogen exposure. Identification of sufficient quarantine/isolation space is often a major challenge. All in/all out strategies followed by thorough sanitation help alleviate the need for dedicated quarantine/isolation facilities. Traffic patterns between buildings and pastures must be managed effectively to minimize exposure from contaminated vehicles, feedstuffs, bedding, and humans.

Vermin traffic is another major problem outside the laboratory. Rats, mice, birds, and insects must be denied access to barns and feed storage areas. Constant vigilance is necessary to maintain an effective control program.

## Social Environment

Agricultural animals are highly social and should be housed in groups whenever possible to avoid preventable stress. Intragroup hierarchies are common and often require appropriate management to avoid serious injury. The introduction of new animals into a group usually requires additional observation and intervention. Males typically require more attention than females. Poultry can be particularly aggressive, which has resulted in the development of standard agricultural practices (e.g., beak- and toe-trimming) to prevent serious injuries.

Human-animal interaction also contributes to the social environment of agricultural animals and requires appropriate management to avoid preventable stress. Evaluation of the social environment provided for agricultural animals is an important component of semiannual facility inspections. Training programs for investigators and caretakers should

emphasize the importance of providing an appropriate social environment.

## Investigator Qualifications

Nonveterinary scientists often perform experimental surgeries on agricultural animals. It is the responsibility of the investigator to provide satisfactory documentation of adequate training and experience to conduct these procedures. The IACUC may require initial procedures to be conducted under the supervision of the attending veterinarian to ensure that essential technical skill has been achieved. Appropriate personnel also must be available to conduct satisfactory postsurgical observation as long as necessary.

## Veterinary Care

An effective institutional animal care and use program depends on adequate veterinary services. Institutions that attempt to function with limited veterinary facilities and staff make a critical error. In conjunction with the IACUC, the attending veterinarian serves as the primary arbiter of quality assurance for the institutional animal care and use program. Adequate time and authority must be accrued to fulfill all responsibilities attendant to the position. A solo institutional veterinarian may be required to serve on the IACUC, review all animal use protocols, consult with investigators, and provide animal care for multiple species. In this scenario, providing veterinary coverage on weekends and holidays taxes the system and compromises the quality of care. Projects that require periods of 24-hr care cannot be managed effectively by a single veterinarian with limited support staff. Investigators and caretakers may or may not be qualified to provide adequate technical assistance.

Projects that overburden program resources must be identified during the protocol review process. Appropriate solutions must be developed and agreed on by all parties before final protocol approval. The institution or investigator may be required to provide additional funds to hire consultant or relief veterinarians and veterinary technicians to ensure adequate animal care. It may be necessary to accomplish projects at other locations with the assistance of collaborators.

## Summary

Farm animal research conducted outside the laboratory presents a number of unique concerns for the IACUC. Nevertheless, basic nutritional, environmental, and behavioral needs must be met. The *Ag Guide* provides definitive general guidance for establishing effective institutional poli-

cies, health care standards, and species-specific animal husbandry procedures.

## References

- APHIS [Animal Plant Health Inspection Service]. 1998. Regulation of agricultural animals (policy 26). In: Animal Care Resource Guide. Washington DC: US Department of Agriculture.
- APHIS [Animal Plant Health Inspection Service]. 2000. Farm animals used for nonagricultural purposes (policy 29). In: Animal Care Resource Guide. Washington DC: US Department of Agriculture.
- Casper J, Heath SE, Linnabary RD. 1999. Preparing the farm and farm animals for disaster. In: Allen T, ed. Information Resources for the Institutional Animal Care and Use Committee (Animal Welfare Information Center Resource Series no. 7). Beltsville MD: US Department of Agriculture. p 452-458.
- CFR [Code of Federal Regulations]. 2000. Title 9 (Animals and Animal Products), Subchapter A (Animal Welfare), Part 1-4 (9CFR 1-4).
- FASS [Federation of Animal Science Societies]. 1999. Guide for the Care and Use of Agricultural Animals Used in Agricultural Research and Teaching. 1st rev ed. Savoy IL: Federation of Animal Science Societies.
- NRC [National Research Council]. 1996. Guide for the Care and Use of Laboratory Animals. 7th ed. Washington DC: National Academy Press.